

REMARKS

Applicants will address each of the Examiner's rejections in the order in which they appear in the Office Action.

Claim Rejections - 35 USC §103

Claims 1-4, 6-11, 13-16, 18-27, 40, 42-47 and 49-52

In the Office Action, the Examiner rejects Claims 1-4, 6-11, 13-16, 18-27, 40, 42-47 and 49-52 under 35 USC §103 as being unpatentable over Oikawa et al. (US 4,770,948) in view of Prall et al. (US 5,341,016). This rejection is respectfully traversed.

The present invention, as recited in pending rejected independent Claims 1, 4, 16 and 52, is directed to a semiconductor device having a wiring which comprises a metal film and a nitride film, wherein the wiring includes at least one inert element and 90% or more of the inert element is argon, and an amount of sodium contained with the wiring is equal to or less than 0.3 ppm. Independent Claims 1, 16 and 52 recite that the metal film is a tungsten film. Rejected pending independent Claim 40 is directed to a semiconductor device having a wiring wherein the wiring comprises a nitride film and a film comprising tungsten, wherein the film comprising tungsten includes at least one inert element, and 90% or more of the inert element is argon, and wherein an amount of sodium contained within the wiring in the semiconductor device is equal to or less than 0.3 ppm. Applicants respectfully submit that these features are not disclosed or suggested by the cited references.

The Examiner, however, contends in the Office Action, that Oikawa discloses a semiconductor device comprising wirings (5) formed over a substrate (1), the wirings comprising a tungsten film, wherein the wirings include at least one inert element, and 90% or more of the inert element is argon, and wherein an amount of sodium within the wirings is equal to or less than 0.3

ppm (emphasis added).

Applicants respectfully disagree. While the Examiner alleges that Oikawa discloses that an amount of sodium contained within the “wiring” in the semiconductor device is equal to or less than 0.3 ppm, in fact, Oikawa teaches a concentration of sodium in a target, not in a wiring. In general, the amount of sodium within a target is not necessarily the same as a concentration in a wiring. For example, when a wiring is formed, the amount of sodium within the wiring is inevitably increased compared to that of a target as sodium can enter into the wiring from various sources, such as for example, from a substrate, substances adjacent to the wiring, contaminants from a chamber, and gasses during sputtering. Hence, that which is disclosed in Oikawa (i.e. concentration in a target) does not disclose or suggest the claimed invention (which is directed to concentration in a wiring).

Further, Oikawa discloses a sodium content only in a molybdenum target without any teaching or suggestion regarding concentration in other metals, such as tungsten. To further distinguish the claimed invention, Applicants have amended independent Claims 1, 16, 40 and 52 to recite that the amount of sodium contained within the *tungsten* film is equal or less than 0.3 ppm. It is respectfully submitted that the cited references do not disclose or suggest this feature.

Therefore, for at least the above-stated reasons, the rejected claims are patentable over the cited references. Accordingly, it is respectfully requested that this rejection be withdrawn.

Claims 5, 12, 17, 28-39, 41 and 48

The Examiner also rejects Claims 5, 12, 17, 28-39, 41 and 48 under 35 USC §103 as being unpatentable over Oikawa in view of Prall and further in view of Ikeda et al. (JP 8-153722). This rejection is also respectfully traversed.

Claims 5 and 12 are dependent on Claim 4; Claim 17 is dependent on Claim 16; and Claims

41 and 48 are dependent on Claim 40. Accordingly, for at least the reasons discussed above for these independent claims, each of these dependent claims is also patentable over the cited references.

Independent Claim 28, and those claims dependent thereon, recite that the wiring comprises a phosphorus doped silicon, a nitride film, and a film comprising tungsten. Claim 28 further recites that an amount of sodium contained within the film comprising tungsten is equal to or less than 0.3 ppm. Hence, for at least the reasons discussed above for the other independent claims, independent Claim 28 is also not disclosed or suggested by the cited references but is patentable thereover.

In addition, the Examiner appears to be relying upon Ikeda as disclosing a semiconductor film (104) with n+ doped silicon (103a, 103b). The Examiner admits that none of the cited references disclose that the n+ doped silicon is phosphorous doped silicon but contends that phosphorous is commonly used to dope the silicon in order to form the source and drain regions of the transistor.

However, Claim 28 recites a phosphorous doped silicon as part of the wiring. The Examiner cites 103a, 103b from Ikeda, but these regions are source and drain regions which are clearly different than the claimed wiring. Further, the Examiner relies on what is allegedly known in the art for source and drain regions. As neither of these are directed to the wiring, it is respectfully submitted that the cited references fail to disclose or suggest the claimed invention, and the Office Action fails to make a prima facie case of obviousness.

Accordingly, the claims are patentable over these references. Therefore, it is requested that this rejection also be withdrawn.

Information Disclosure Statement

Applicants are also enclosing an information disclosure statement (IDS) herewith. It is respectfully requested that this IDS be entered and considered prior to the issuance of any further

action for this application.

If any additional fee is due for this IDS, please charge our deposit account 50/1039.

Conclusion

It is respectfully submitted that the present application is in a condition for allowance and should be allowed.


If any fee should be due for this Amendment, please charge our deposit account 50/1039.

Favorable reconsideration is earnestly solicited.

Respectfully submitted,

Date:

June 21, 2005


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